G R S IX 5]

Previous references

Mun. I - 7(3,4) 1917-18 (Mun.)

Later references

Q37 Province

File No 78-17

Serial Nos 1735 7, 8 & 10

2

GENERAL AND REVENUE SECRETARIAT

Serial Nos 7 & 10

Part B for July 1918

SUBJECT.

Deputation of officers of the Bangalore city Municipality to Bombay

8(7) From the President, Mun. Council, Bangalore city
No 360/C 9 Dt 20-3-1918

Submits a report drawn up by Messrs D'Cruz & T Ramachandra Rao about the working of the System of Ejectors & other municipal matters in the Bombay city

8(10) To the Presidents, Mun. Cls Bangalore
Presidents of other Head Qrs

W D 38—GPB—50 000—21 7 16

To The Chief Engineer of Myore:
" Chairman City I T Bd Myore

No 1805 -17 Dy 31-7-18

Circular Copies of the report which is printed for information

Wm Abdur Rahman Khan
11/2/19

G R S III—1] 1917-18

2342

GENERAL AND REVENUE SECRETARIAT

(Mul)

NOTES.

File No. 78-17

FILE HEADING

Deputation of Officers of Bangalore City Munr to Bombay

From

The President, Munl Council, Bangalore City

No 360 C.B Dated 19th & 20th March 1918 Received 22-3 1918

Diary No 2342	Enclos 2 Spare Copies	Serial No 7

BRIEF ABSTRACT OF LETTER

Submits a report drawn up by Messrs D'Cruz & T Ramaswamy Rao about the working of the system of Sanitary Inspectors & other Munl Matters in the Bombay City

NOTES AND ORDERS

Sub-E for information

26/3/18

2) The report deals with the Drainage System of Bombay in particular and generally with other Munl affairs including City Improvements undertaken by the Trust Board We are not

NOTES—First Sheet

WD 1232—GPB—20 00 18 11 16

G R S III-2]

General and Revenue Secretariat | File No 78 of 1917

Serial No

Mainly connected with the drainage System of Bangalore The report of Mr D'Cruz deals with many technical details If approved the report may be sent to the Chief Engr for perusal and such remarks as he considers necessary on the suggestions contained in the report regarding the adoption of the Shone's Ejector System Submit for perusal & orders

Revenue)

Secretary)

5346 9/4/18

Seen.

I hope Mr D'Cruz will make use of what he has observed The notes may be printed for future reference and circulated to the larger municipalities

H.P.B

7.5.18

Submitted with draft for approval

8.5.18

Issue

Letter No 6394 dated 13.6.18 to the Superintending Engineer forwarding a copy of the Government Order passed and requesting that a copy may be sent to this office

NOTE—Contn sheet

WD A 1769—GPE—60,000—20-8-18—S

G R S III-2]

General and Revenue Secretariat

Mil File No 78 of 1917

Serial No.	
9	From the President, Mysore Council, Bangalore No 530/C.9 & 26/28 June 1918 Submits in continuation copies of the resolutions of the Mysore Council & the City Improvement Committee 8) The printed copies of the Report have been received - A draft G.O as in para 4 is submd MON Secy 25/7/18 9) For perusal & opn is req 26/7 29.7.18 9) Returned
10	To The President, Mysore Council, Bangalore " Presidents of Other Head Quarter Town Mysore Cities with 50 copies Mysore Councils " President of Kolar Gold Fields " Chief Engr of Mysore " Chairman City I T B, Mysore } with a copy of Report. No 1805-17 & 31 7 18 Circulates copies of the Report which is printed for information

NOTE—Contn sheet

WD A 1769—GPB—60 000—20-8 18—S

[M 109]
Rel 78-17-7

OFFICE OF THE PRESIDENT,
MUNICIPAL COUNCIL,
BANGALORE CITY, DATED 19-3- 1918

FROM

DEWAN BAHADUR RAJA SABHA BHUSHANA
K P PUTTANNA CHETTY, ESQ, C I E,
Honorary President, Municipal Council,
Bangalore City

To

The Secretary to the Government of
His Highness the Maharaja of Mysore,
Commercial and Revenue Department,
Bangalore

SIR,

Adverting to Government Proceedings No 3423/M1 78-17-6 dated the 28th December-1917, I have the honor to submit herewith for the information of Government a copy of the joint report dated the 5th March 1918 of the Executive Engineer, City Drainage Project and the Municipal Engineer on the working of the Shone System of Ejectors and other Municipal matters in the Bombay City The report is also signed by Mr B Usman Khan, Municipal Councillor, who accompanied these officers

2 A further report will be submitted for the orders of Government after the consideration of the subject by the City Improvement Committee and the Municipal Council in due course

I have the honor to be,
Sir,
Your most obedient servant,
K P Puttanna Chetty
Honorary President

C R.G

GPB—2,000—20-8-15

Rev Dept. 1916

From

The Honorary President
Municipal Council
Bangalore City.

To

The Secretary to the
Government of Mysore
Revenue Department
Bangalore

Received 23/3/18 4 30pm

Dated 19th
Despatched 20th } March 1918

Received

General No 360 11765
No

Enclosure No one report +
a book with plans of report

Submitting a copy of
joint report of the Executive
Engineer City Drainage
project, Municipal Engineer
and Mr B Womersley
on the working of the Shone
System of Ejectors and
other Municipal matters
in the Bombay City

MS

REPORT ON OUR INSPECTION OF THE SEWERAGE SYSTEM IN BOMBAY WITH SPECIAL REFERENCE TO THE SHONES EJECTOR SYSTEM INSTALLED THERE, AND OF CITY IMPROVEMENTS CARRIED OUT BY THE IMPROVEMENT TRUST BOARD

Period of stay in Bombay — We arrived in Bombay at noon, the 5th December 1917 and left on Tuesday the 11th for Bangalore, spending 6½ days in Bombay

I —Sewerage System

Points regarding which we were instructed to investigate in Bombay —The following are the points regarding which we had instructions to investigate —

1 Ejector *versus* pumps
2 Data for calculation of sewage for street drains
3 Methods of admitting a portion of storm water into sewers for purposes of seasonal cleansing
4 Ejector at the outfall

Records taken —The records taken by us were (1) A key map showing the proposed position of ejector stations at Bangalore and of the air compressor station (2) A statement of actual lifts required at each ejector station both of which are submitted herewith

Officers and gentlemen interviewed in connection with the Bombay sewerage — We interviewed (1) Mr Machison, the Municipal Engineer who has under him the departments of drainage of water-supply, and of roads and buildings (2) his Deputy Mr Maughan, the Drainage Engineer and (3) the Assistant Drainage Engineer (4) and met Mr Ghandi, Engineer in charge of the Colaba Air Compressor Station All these gentlemen are immediately connected with the sewerage system of Bombay

Places visited and works inspected —With regard to sewerage works we inspected the following —

1 The Worli outfall pumping station
2 And the air compressor station there
3 The Air Compressor Station at Colaba
4 Shone s ejectors
5 The methods of house connections with street sewers in various parts of the town
6 Public and private latrines and urinals
7 Matunga sewage farm

Method of eliminating grit and floating matter from sewage before pumping — At Worli pumping station, the main sewer of the City discharges into a longitudinal settling masonry trough or sump in which an endless chain or belt of dredgers works, scraping up the grit and stones, etc , deposited at the bottom and automatically emptying the same above the sump This is carried away by barrows to the area outside the station and used to reclaim the low lying parts of the ground around it The sewage after being dredged is admitted, by opening a penstock valve, to a system of screens of various meshes from coarse to fine where all floating matter such as straw, sticks, and rags, etc are intercepted and removed

The screened sewage is then admitted to the pump wells, from which it is pumped into the sea by reciprocating beam engines and ram pumps worked by steam, through two cast iron sewers 6 feet in diameter The outfall sewer is being extended into the sea, to avoid the present nuisance from smells due to the sewage being washed ashore by the tides Formerly pumping was done by Worthington Engines and pumps, but they were found unsatisfactory They have now installed Ram-pumps in two pairs, of which, one pair works at a time The old Worthington Engines and pumps which were being over hauled at the time are made use of in addition to the present pumps to cope with the large quantity of storm water which enters the sewer mains during the monsoons Mr Maughan was of opinion

that the present installation of Ram pumps was found more satisfactory than the old centrifugal pumps

Air compressor stations —There are two compressor stations The larger at Worli adjoining the pump house supplies compressed air to 30 ejectors in the northern and central portions of the city while the smaller compressor station at Colaba works only five ejectors in the south or Colaba portion of the city At Worli station there are four compressors two large and two small for supplying compressed air, of which one large and one small work at a time The compressors are worked by steam power An indicator in the room gauges the compression of air The compressed air is pumped into and stored in four air receivers outside the pumping house, which consist of steel cylinders, hermetically sealed The shell of old boilers with the inner tubes removed and the ends rivetted up have been utilized as compressed-air receivers

At Colaba there are three air compressors originally worked by steam of these, two have been adopted to work by electric power, and the third still working by steam power has been held in reserve as a precautionary measure against the contingency of electric power being shut down for any unforeseen reason When sewage is abundant during the rains, two compressors are at work but during the dry weather, one is sufficient The compressed air is, as at Worli, pumped into two receivers outside the building housing the compressor

Distribution of compressed air – The air pipes carrying compressed air to the ejectors are graduated in size beginning with a 14" cast iron pipe and gradually branching off in smaller pipes up to 3" in section The system of air distribution pipes is arranged like a water distribution system

Ejectors –An ejector is a self-acting machine consisting of a large cast iron inverted bell-shaped vessel into which sewage flows from a main or a submain sewer through a non return flap valve so arranged, that sewage may enter the ejector but cannot flow back into the sewer The compressed air pipe is connected with the upper part of the vessel and admission of compressed air is controlled by a specially constructed valve actuated automatically by the rise of sewage in the ejector At the other end of the vessel is another pipe known as the 'rising main' through which the sewage from the ejector is ejected the valve connecting the vessel with the rising main opens outwards and allows sewage to be forced from the ejector to the main but does not admit sewage from the main back into the ejector As soon as the sewage from the main nearly fills the vessel, the valve on compressed air pipe automatically opens while the valve connected with the exhaust pipe shuts, and compressed air is admitted to the surface of the sewage which is forced up the rising main As soon as the chamber is empty, the admission of compressed air is automatically cut off and the exhaust valve is opened and sewage again enters from the submain, and so on The emptying of the ejector takes barely one minute All ejectors are placed in masonry chambers below ground, and ingress to these chambers is through an ordinary manhole cast iron cover in the road and down a wrought iron ladder, but owing to the inconvenience of getting in and out of the ejector chambers and to impeding traffic when these covers are removed for inspection, the Municipality is arranging to have the ingress to the ejector chambers through a tunnel from the pavement on the side of the road to the chamber, with a flight of small steps leading from the road level to the floor of the chamber At each ejector a ventilating shaft is provided on the side of the road and carried up above the tops of buildings in the vicinity and through this shaft the compressed air admitted into the ejector is allowed to exhaust after doing its work We learnt from Mr Maughan that although compressed air is barely one minute in contact with sewage, it is sometimes found to be offensive and there have been complaints from residents in the vicinity of these exhaust shafts, necessitating in some cases their being raised in height

From all enquiry, it is found that the ejector as an appliance for lifting sewage has worked very satisfactorily in Bombay and except for minor trouble owing to rags and sticks getting into the seating of the inlet valve that admits sewage into the ejector or owing to the valve that admits compressed air through a small vent hole getting choked occasionally, there has not been much trouble or inconvenience caused During the monsoons however when areas of the city get flooded and the sewage flow is much augmented by the storm water getting into the sewers, ejectors were found incapable of dealing with the augmented flow

Under the air compressor station at Worli, there are about 30 ejectors, in various parts of the city and the lift at these ejectors, varies from 20 feet to 40 feet The highest lift of 40 feet occurs only at one or two places The capacity of the ejectors varies from 250 to 1,200 gallons The ejectors take about a minute to fill and a minute to empty

In some cases, the ejectors are arranged to pump sewage in stages One ejector lifting its sewage to the submain of the system that feeds another ejector, which has to pump not only the sewage that gravitates to it from the area it serves, but also the ejected sewage from the ejector below

The efficiency of the air pressure system in Bombay however is said to be only 20 per cent and all the Engineers connected are of opinion that there is a great waste of power in consequence

Cause of waste power —The Engineers are not quite clear about the causes of this loss of power They say that a pressure adequate for the maximum lift has to be maintained although this lift may occur only in the case of one or two ejectors (2) There may be a loss of power in transmission (3) There is a loss of power in compressing air, owing to heat generated which is wasted (4) There is frictional loss in the air distribution system (5) The compressors have to be worked night and day to maintain the maximum pressure although the sewage ejectors work intermittently and only when they fill

They are already substituting steam by electric power, as they find the latter more economical in point of cost and efficiency, although they are keeping part of their steam plant in reserve as a stand by in case of electric power failing at any time

A scheme to substitute Shone's ejectors by motor driven stereophagus pumps — Messrs Mackison and Maughan are getting up a scheme for substituting the Shone's ejector system by a system of electrically driven pumps, whereby they expect better efficiency, at much less cost The electric motors would be actuated by a float which would rise and fall with the sewage in the well and would automatically switch on or switch off the motor and pump connected with it By using a special pump known as the Stereophagus pump, which is provided with jaws of some kind to crush and break up all stones and sticks, etc, passed through the pump with the sewage, it is hoped to get over the trouble that is experienced in the use of the ordinary centrifugal or of the ram pump for lifting crude unscreened sewage The jaws of the pump are said to be made of some special metal which is practically unwearable The pumps cost much less than ejectors and being actuated automatically like the ejectors are quite as economical to maintain They are said to be the only pumps invented to deal with unscreened town sewage The saving in power would be great, as each pump and motor working it would be designed only of sufficient capacity to do its work The application of power would be only when and for as long as required, as power would be automatically shut off when the well is emptied

How they are going to prevent the nuisance that is inseparable, except in Shone's system, from the operation of pumping sewage is yet to be learnt, as ejectors occur often in the centre of busy streets and at crossings What arrangements would be made for housing their motors and pumps is not clear They would possibly have their wells of cast iron hermetically sealed, just like ejectors, and separate the motor from the pump or its suction pipe by a screen wall The housing of the motor and pump at each station must be underground, as there is no room above ground for a pumping station in many of the localities where the ejectors occur We have to await the development of the proposed scheme of substituting the ejector system by motor driven stereophagus pumps, if we wish to see the result

The comparative conditions that exist in Bombay and Bangalore relative to the Shone's ejector system —In Bombay the country is flat and sewage has to be lifted mainly to secure gradients till the sewage enters that portion of the system that is solely on the gravitation principle and through which the main that leads to the outfall passes Whereas in Bangalore we have undulating country with good gradients and we have to lift the sewage only from distinct natural outfalls or valleys on the west and pass it on to the system leading to the main outfall on the east, so that lifting in stages is not necessarily required as in Bombay In Bombay except in

the case of one of two ejectors where the lift is 40 feet, the lift at each ejector is fairly uniform, *viz*, about 25 feet Whereas, in Bangalore the lifts as at present arranged vary widely from 35 to 84 feet and as the air pressure has to be kept up to meet the requirement of the highest lift, the ejector system in Bombay would be more economical than at Bangalore As at present designed in Bombay there are 30 ejectors under one compressor station and five under another Whereas in the whole of our system there are only seven ejectors In Bombay the rainfall is much heavier and more intense than in Bangalore with the result that during the monsoons various parts of the city are under water and the sewage is much augmented by storm water entering the sewers, so that the ejectors are strained to their utmost to do their work In Bangalore there will be practically only house sullage, with but little admixture of storm water to be dealt with by the ejectors By adapting at suitable points storm overflows from man holes on the sewers to the storm drains, much relief could be given to the ejectors and consequently to the air compressor In Bombay the ejector stations are in the midst of populated areas, on thoroughfares and at crossings, whereas our ejectors are away from buildings, so that the slight nuisance that is caused in Bombay by the escape of compressed air after it has done its work, would be absent

After consulting Mr Maughan and going through the ejector system in Bombay our humble opinion is that our ejectors may be rearranged to get lifts as uniform as possible, so as to secure better efficiency (2) by having our air system designed by Shone's experts in England or in America, we might be able to secure a higher efficiency in the air distribution than at Bombay (3) If lifting sewage for irrigation is to be done at the outfall by ejectors, the compressor station should be at the outfall so that it may be near the largest ejectors If however the sewage at the outfall is to be pumped by motor driven stereophagus pumps, the present location of the air compressor station ought to do for the rest of the ejectors By taking all precautions for preventing storm waters entering our pipe system and by relieving the sewers at the various outfalls or natural valleys on the west and at storm overflows on the east we could regulate the work thrown on the ejectors so that they may not be burdened as in Bombay with more work than they can do In fact in our humble opinion the crux of the whole position in Bombay lies in the solution of how to deal with the monsoon flow of sewage where there are no natural valleys or outfalls, where it is difficult to get storm overflows to relieve the sewers—where practically all attempts at separating sewage from storm flow and of dealing with it separately are nullified by the very heavy rainfall of the western coast and by the topography of the Island This is one of the reasons why all open connections with the street sewers are being substituted by closed and sealed connections

Further study of Shone's ejector system —With our study of the subject we should be able to draw up a set of queries which may be sent to the Municipalities in Karrachi, Calcutta and Rangoon where the Shones ejector system has been at work for years, to find out further from the officers in charge in those cities about the efficiency of the system there

What might be done in the meanwhile —After rearranging our ejector stations to have as easy and as uniform a lift, without multiplying them unnecessarily, we would recommend that we at once communicate with Shone's experts in England and get advice and estimates for a complete system and that we also write and get literature about the stereophagus pumps and their application to lifting unscreened sewage with suitable motors to drive them and get estimates also for an installation with these pumps We could then compare first cost and maintenance charges with efficiency expected

House connections —What we saw of house connections in Bombay is what is usually done where a water carriage system prevails There were a few instances where surface drains carrying sewage were connected with underground sewers by means of 'Jump wells" or what is otherwise known as "leaping weirs We were favoured with the *detail instructions* (Appendix A) about house connections issued by the Municipal authorities which is submitted herewith

Latrines and urinals —We inspected several public latrines some of them were of the type of trough closets which are anything but sanitary—others were

of the usual pattern of flush latrines with Hindustani or Oriental pans with a large flushing tank above or on a side to flush all the pans at stated intervals We saw an arrangement by which the flush was actuated by opening the door There was one latrine with a range of cubicles provided with glazed stoneware pans on either side of a central open drain into which the contents of the pans were flushed out at fixed intervals of time This was in a very poor locality where over a 1,000 people used it night and day and it was surprisingly free from faecal odours The open drain emptied into a gully trap communicating with the street sewer

The urinals are all being constructed with white glazed stoneware suitable for use by Indians and Europeans with a flush tank that works at intervals and sprays or washes down the whole surface of the urinal keeping the whole arrangement free from smell

Data for calculation of street drains—On enquiry as to the data adopted in the calculation of street sewers, it was found, that the population of each street as per census was taken, with an allowance for prospective increase In the case of new extensions the allowable density was assumed and sewage allowance based on an hypothetical population The smallest diameter of street sewer was 7" where the ground is undulating and good falls can be secured but for the city generally a minimum diameter of 8" has been adopted for street sewers In Bombay the water allowance is from 30 to 40 gallons per head while at Bangalore it is nearly 12½ gallons, so that our minimum diameter of 7" ought to suffice, especially as our gradients are generally very good Sub soil water to some extent enters the sewers in Bombay

Method of admission of a portion of storm water into sewers for seasonal cleansing—With regard to the admission of storm water into sewers we found that every effort possible was being made to exclude storm water from sewers Owing (*a*) to the system of lifting sewage at 35 points at ejectors and ultimately at the outfall (*b*) The difficulty of getting storm overflows (*c*) The dust and detritus that is washed down by storms getting into low grade pipes and depositing there Every additional gallon of sewage to be pumped up either at the ejector or at the outfall means cost—and as all the sewage has to be dredged and screened at the outfall, it is economical, that as much of road detritus and floating matter as can be, be excluded from the sewerage system

Mr Maughan has however patented a cast iron cover over the vent holes on the side of the road communicating with storm water drains, by which, during the monsoons, rain water can be freely admitted into storm drains which are all underground but during the dry weather the covers may be reversed and would thereby shut off any emanations from stagnant storm drains in bazaar streets

The arrangement is as ingenious as it is simple, the cover consists of two cast iron gratings, when put together in one position of the upper grating, which is removable the slots on the upper grating coincide with those on the lower and consequently storm waters can enter the drain freely, but when the rains cease, and the upper grating is reversed the slots of the upper grating do not coincide with those of the lower but lie on the ribs of the lower, and so, the opening into the drain is closed Dust from the road soon makes the cover air tight and emanations from stagnant storm drains to shops and houses on the road side are prevented

Ejector at the outfall—With regard to our arrangement of ejectors, Mr Maughan noticed that the small ejector in No 2 Drainage area may be arranged to pump direct into the rising main instead of into the delivery main This is certainly a good suggestion He further suggested that, as the largest ejectors would be at the outfall consuming the largest volume of compressed air, the compressor station might be placed at the outfall The air supply pipes to the smaller ejector would be thereby reduced in size and result in saving of cost—or we might employ stereophagus pumps at the outfall and ejectors elsewhere—in which case the present location of the air compressor station would do well

II City Improvements carried out by Trust Board and Municipality

In connection with City Improvements we had interviews with Mr J P Orr, Chairman of the Improvement Trust Mr Katrack the Engineer of the Improvement Trust and his assistant Mr Prabhawlkar and through the kindness of Mr Ghandi the Solicitor of Tata's works with Mr Wadia, Architect and Surveyor who was previously intimately connected with the City Improvement Trust

With regard to the improvements, we inspected (1) several street improvement schemes (2) The creation of suburbs by the Trust Board for the better classes and for the poorer (3) The Gamadevi extension and (4) The Agripada extension (5) Matunga a new garden suburb, proposed to the north of the Island where roads have been marked out

Improvement works and Town planning—With regard to the improvements in Bombay, the scale on which the Improvement Trust is working is something colossal when compared with what is possible in Bangalore Their schemes are (1) Street improvements (2) Reclamation schemes (3) Layout of suburbs

Difficulties in Improvement works—In Bombay, the difficulties in improvements to be faced are (1) The scarcity of unoccupied lands, suitable for building purposes (2) The costliness of land and buildings in the more crowded and commercial localities where improvements are needed on sanitary grounds and also for facilitating traffic (3) The litigiousness of the people backed with financial means for contesting suits relating to acquisition of property (4) Congestion in population and in traffic due to the intense commercial nature of the city and necessitating the construction of tenement houses almost everywhere It is not possible within a certain radius of the centre of the city to get away from the Chawl system of housing more especially for the poor or working classes (5) Land is so costly in Bombay that it is certainly a loss, if owners do not build up to the maximum height allowed by the Municipal Regulations The construction of garden suburbs is therefore a very difficult problem in Bombay

Bombay improvements—The City Improvements are mainly designed and worked out by the Improvement Trust The Municipality as a rule only suggests what localities require improvement The only improvement of any magnitude taken up by the Municipality itself is the Church gate street The improvements are mostly initiated by the Chairman or members of the Trust and sometimes by Government

The Improvement schemes whether for widening of roads or removing of slums include acquiring of whole blocks of adjacent properties so that a thorough realignment of the street or the slum area is possible—they do not confine themselves to the acquiring of just the portion of property affected by the Improvement as is being done in Bangalore This plan adopted in Bombay therefore not only tends to the aesthetical development of the city but makes the net cost of the scheme comparatively small since the areas acquired when resold realise the major portion of the cost of the scheme There is at present no betterment rate charged for the properties left over which are really the first benefited by the Improvements The Trust Board is said to be considering the question

3 As soon as the improvement of the locality is decided upon, the Engineer marks out the area on the plan, with suggestions how the locality can be relaid This is inspected by the Board and approved with or without alterations, then the Land Manager, a highly paid officer takes up the valuation of properties, on certain definite lines—*vide* form enclosed—and submits the statement of valuation There is no committee for valuation Every improvement scheme should contain provision for re housing the people, especially the poor, by building Trust owned chawls The Trust Board Officers said that not more than 5% of the displaced will be or have been thus provided for, there is no system of giving land free or at concession prices to the displaced to build on This system may be alright in Bombay when the displaced are 90% not owners of houses but tenants who will be better off when placed in Trust chawls on easier rents and better living conditions The owner is usually a rich landlord who will not be much injured so long as he gets a fair price for his property for he can invest the money in a thousand and one ways the loss of rent is no concern to him But in Bangalore when the properties are of small value and where owners live or where the rents accruing therefrom form the chief means of livelihood of the owner the destruction of house property hits the owner very hard and the concession of giving sites free or for easy upset prices must continue The system of making it compulsory to provide for houses for the poor in every scheme of improvement is no doubt very good But in Bangalore so far except the new market scheme the schemes are mostly those affecting parts of houses not whole properties, so that the displacement is not very grave It is suggested however,

in every scheme of improvement affecting entire houses, that sites be reserved for all displaced people

4 The valuation of properties is conducted on an elaborate scale, *vide form enclosed* Appendix B

The awards are made by the Collector of Bombay, a special tribunal consisting of a Judge of the High Court, a Barrister and an Engineer hears appeals against them, there being a final appeal to the High Court Only a small number of cases are contested The contested cases are placed in the hands of Architects, who work them up

5 The Engineer's responsibility ceases with the preparation of an estimate for construction of roads, etc The laying out of house sites, etc , in areas enclosed by roads is made by the Deputy Land Manager in consultation with the Engineer

6 The property of the Trust consist of two classes (1) what has been made over to them by Government or by the Municipality, (2) what has been acquired from Trust Funds The disposal of the former is in the shape of leasing out, not of outright sale The latter is either leased out or sold outright In the former case the lease is restricted to 99 years while in the latter it may run to 999 years

The rate of lease is calculated so that it yields 4½% on the capital outlay

In the disposal or sale of trust owned properties, sites are sold at a price equal to 22 years purchase at 4½% on capital outlay while acquisition is done on the basis of 20 years purchase The system of lease is no doubt preferable to the outright sale for both parties, the lessors and lesses, but it presumes the possession of a reserve fund for the purpose by the local body The Bangalore Municipality does not seem to be much favoured in this direction It seems worth trying however by seeking a loan from Government at 3% and investing it at 4%

7 We inspected some of the poor house chawls in the Agripada scheme, they are not suited to Bangalore One point however deserves mention The locality was formerly peopled by a large number of weavers who are not permanent residents of Bombay A big weaving shed has been erected in an open space with paved yard all round to accomodate about 200 weavers, each loom is given a space of 12' 6" × 12' where the weaver does his work during the day and sleeps during night There is a separate kitchen block and baths provided for the weavers The shed has ample light and ventilation as the exterior wall is made of glazed frames

In Bombay it must be specially noted that no building is allowed on any area taken up for improvement by the Trust unless the plans and estimates are got up by one of the licensed architects of the Trust Every plan so submitted has further to pass through the scrutiny of the Engineers and of the special Architect of the Trust and subsequently of a special building committee of 3 or 4 technical members before the plans are approved and permission given to start construction The result is that the vast sums of money spent in improvement schemes are not wasted but substantial improvement of the areas treated is ensured

In Bangalore on the other hand costly extensions are ruined owing to indiscriminate, ill planned and uncontrolled building operations so that the city has little to show in the way of substantial civic improvement except that provided by nature in the virgin soil and fresh air of the area and the orderly layout of roads and lanes, sometimes too orderly The neglect of those park areas and public squares in Basavangudi and Malleswaram is evidence of the want of public concern in potential beauty spots and points of interest Town planning in Bangalore has not got further than the layout of roads and lanes and the inevitable circle at intersection of main roads To make each building and the area round it interesting and beautiful, to obtain street effects by prescribing the building lines of houses and by suitably treating the grounds before them, to construct houses of good design and material and of architectural beauty to carefully plan out and raise up park areas, to fence plant and equip play grounds in short to utilize to the best advantage waste space are all worthy of inclusion in the programme of Bangalore Civic Improvements

One striking feature of Bombay is the absence of sharp corners of buildings at junctions of roads Every such corner is rounded off to the extent that the alignment of the junction requires This is a point worth noting, and generally

adopting in Bangalore We are doing this to some extent already but against the strong protest of the people and owners of properties

The widening of roads is being done on a large scale in Bombay on the principle of "set backs" *i e*, the extent of widening is marked on the plan and on the ground, no repairs of any sort or reconstruction is permitted of properties falling within that line Even very important shop streets like the Abdul Rahiman street is being widened on this principle Whenever the owner wants to rebuild his shop, he has to do so setting back the front line, the portion thus left by him is compensated There are many recesses on each road owing to individual 'Set backs' and the Trust Board has thus made the widening of particular streets not the subject of immediate improvement but of gradual development This also keeps down the initial cost from mounting up at once, and secures an absolute check against further narrowing of the street The same scheme is proposed to be adopted in Bangalore for the Taluk Cutcherry and Arlepet roads But unfortunately the Municipal Council Committee have decided to limit the widening of the road to 30 feet This it is believed is very insufficient the width should be at least 40 feet or even 60 feet in accordance with the decision of City Improvement Committee which is very appropriate The widening of the Avenue road should also be taken up on this principle but the width should be 60 feet at least The marginally noted roads which are fast becoming shop streets should also be included in the programme and the widths fixed once for all for defining the set backs

1 Gundopanthalu street
2 Arcot Srinivasa Charlu street
3 Akkipet road
4 Balepet road
5 Old Butchers street
6 Police road
7 Aralepet road
8 Taluk Cutcherry road
9 Nagarthapet road
10 Avenue road
11 Rangaswami temple street
12 Jumma Masjid road
13 Woollen Mills road
14 Setty Muddanna s lane
15 Huriopet road
16 Sultanpet road
17 Cubbonpet main road
18 Anjaneya temple street
19 Thigalarpet road
20 Kumbarpet road
21 Mysore road
22 Purna Venkata Rao street
23 Beli Masjid road

The facilities in Bombay when compared with Bangalore are, that in Bombay we have the means of quick and cheap locomotion in a splendid system of tramways and of Railways so that people could live outside Bombay and yet attend their daily work without much inconvenience

The Port Trust are fortunate in incidentally reclaiming the seaside where their docks are building The reclaimed land, as the sea recedes is utilized to the best advantage possible and very beautiful and orderly extensions are being laid out But there is a limit to incidental reclamation of this kind

10 The roads in Bombay are in good condition, clean kept and a large number of them have been tarred The water bound roads are very systematically watered three times a day even small lanes not being neglected

For this purpose on most of the main roads underground hydrants are provided at every 100 feet watering is done direct by hoses coupled on to hydrants Two coolies are in charge of about a mile and a half or two in length The first watering is done about 5 A M, the second watering about 10 A M and the third about 4 P M The whole width of road between kerbs is thoroughly sprayed It takes about 2 minutes to water a road 100' long or about 100' in width The skill with which water is sprayed on the road amidst heavy traffic so as not to splash water on carriages or on pedestrians is worth mentioning Watering is also done by water waggons and casks on bullock carts, when underground hydrants cannot be installed in narrow roads and lanes In such cases iron tanks have been installed in suitable places for drawing water from The tarred roads are not watered but occasionally sprinkled with fine sand

Patch repairs are constantly attended to The quality of general patching up of ruts in water bound roads by hand consolidation is not however very efficient and may be said, without any misrepresentation to be poor If newly repaired patches do not break up it is because of the constant watering of the roads Where a large quantity of patching up in short lengths of road is done the consolidation is done by a light class of steam roller The patching up of tarred roads is however done as it must be, more scientifically When the substructure of the road is not disturbed, it is rarely raked up, only the old coat of dressing is removed, and the surface well swept, a coat of boiled tar is laid and half-inch chippings of shale It is then rolled, then another coat of tar and finer chippings are put on This is

subjected to thorough rolling and finished up with final spraying of tar and a thin layer of fine sand Each bit of such patching up is in charge of Mukadam or Mestri who always stays on the work The pay of the 'Mukadam' is Rs 30 or more No patching up however small is taken up unless a tripod barricade with a red flag is placed on either side to warn traffic The public respect the warning unlike what they do in Bangalore, and people never drive or walk on patches under repairs It may be mentioned that a small length of road was being recoated with tar on the route which H E the Governor drives constantly over Though the operation of tar coating is slower than that of recoating a water bound road, the work may be said to have been attended to leisurely, yet the portion under repairs nearly half the width of road was scrupulously avoided by traffic

Some of the main roads like the Hornby road for instance have not been converted into tarred roads yet, probably because the substructure is not strong We saw some roads being dug up, first a substructure of 12" of boulder packing is done, over this 6" to 9" of tar macadam is laid consisting of 2" to 2½" metal The metal is all crushed in stone crushing machines to different grades The machines having to deal with shale or basalt, comparatively softer material than granite or gneiss, are subjected to less wear and tear This perhaps explains why stone crushing machines cannot be used economically in Bangalore as was found in the Civil and Military Station, Bangalore

On the whole, the roads in Bombay taking into consideration the very heavy traffic they are subjected to are better maintained than in Bangalore or Madras The roads are metalled to full width up to the Kerbing if one exists, or up to the plinths of buildings To prevent the scouring action of running water in a storm, the metalled edge is protected by paving with dressed slabs Those corners, where generally dust accumulates, are kept clean by coolies, boys and women constantly scraping off the dust A better condition of roads in Bangalore cannot be secured unless funds are available as in Bombay, and sufficient staff to do the work systematically It was not possible to get accurate data on the cost of making new roads or maintaining them, but some idea may be formed from the few facts noted below, The coolies get 10 as per day or more, *i e*, nearly as much as our Sub-Overseers There are several grades of supervising subordinates between the cooly and the Sub Overseer A road Sub Overseer has nothing else to do but to make and maintain comparatively shorter lengths of roads than what our Sub Overseers have to deal with They have about 60 steam rollers in Bombay both in the Municipality and in the Improvement Trust It costs about Rs 30,000 to make a mile of tar dressed road 15 feet in width

11 *Foot paths* —All main important roads have foot paths 6 ft to 15 ft in width When old narrow roads are being widened provision is made for foot paths The foot paths are paved with slabs but they are found to be rather inconvenient to walk on, on account of their non resilient surface One would wish while walking on them that they were either gravelled or tarred foot paths

12 *Building operations* —During private building operations, no building material is permitted to lie on the road or foot paths So much so, that though several buildings were seen under construction no building material was visible to a passer-by and in one place on the Hornby road even the scaffolding was hidden from view and the pedestrians on the foot path were protected from falling bricks, etc, by a huge screen of gunny This is a lesson worth attention in Bangalore where cartloads of building material are recklessly littered about even on important roads, inconveniencing and endangering traffic

13 *Urinals and latrines* —There is comparatively a smaller number of public latrines in Bombay than of urinals There is no attempt to place the urinals in hidden corners they are on the contrary built on important roads and squares and are conspicuous The floors and walls are paved and lined with glazed tiles

14 *Carriage stands* —As is necessary in a premier city, Bombay has very good hackney carriages of the 'Victoria' type and good horses A large number of 'Taxi' or motor cars with self registering arrangements showing distances travelled and fares payable ply for hire The hackney carriage drivers also keep a book of fares which may be said to be moderate There are only a few taxi stands at

important centres, but hackney carriage stands are available all over the city There is no special arrangement made for 'stands' on account of the wide roads, stands are provided in the middle or sides of roads and are indicated by sign boards There are no arrangements for sheltering horses as has been proposed to be built in the Bangalore City

J E A D'CRUZ,
Executive Engineer,
City Drainage Project, Bangalore

T RAMACHANDRA RAO,
Executive Engineer,
City Municipality, Bangalore

B USMAN KHAN,
City Municipal Councillor.

D 2234—GPB—100—11-5-16.

Enclosure to no 360/CS dated 20.7.18

Appendix A

GENERAL RULE.

All gully traps when directed by the Drainage Engineer shall be covered with a hinged iron cover and frame of approved design (see Sketch)

_____ Street _____ Ward

(See Sections 231, 234, 239, 240 and 243 of the City of Bombay Municipal Act, 1888, as amended by the City of Bombay Municipal (Amendment) Act, 1905.)

No. _____ of 191 __

From
THE EXECUTIVE ENGINEER,
Bombay Municipality
Bombay, _____ 191__

To
_____
_____

Rules for House and Stable Drainage.

Open Drains

1 In no instance shall a drain interior to a building for the conveyance of the house-sullage to the street sewer be an open drain

2 Open drains shall be constructed according to the plans in the office of the Deputy Executive Engineer, Drainage Department The Drainage Engineer shall have the option of allowing the open drain to be in the centre of a house gully and without side walls The bottom part or invert shall be lined with a 4' half round stoneware channel, the remaining part of the drain being plastered with at least a 1" coating of cement and sand (1 to 1) trowelled to a smooth surface or with any other impervious material (See sketch)

3 At the end of the open drains a silt chamber, 2' long by 7" wide and 12" deeper than the bed of the drain shall be constructed with a vertical cast iron grating 1'-6" from the open drain the full size of the silt chamber This shall discharge into a gully trap connected to an Inspection Chamber (See sketch)

4 The Inspection Chamber shall be not less than 3' long by 18" wide constructed of brick work laid on cement concrete and be internally plastered with a 1" coat of cement and sand (1 to 1) In the chamber a stoneware channel with a half round S W invert shall be formed of the width and full depth of the pipe drain The walls shall be brought up to the surface of the ground and covered with a cast iron air-tight cover and frame (See sketch)

5 The cover of an Inspection Chamber shall be of cast-iron, air-tight, and fitted with a lip into a grooved frame The cover and frame of an Inspection Chamber subject to wheel traffic shall be of cast iron of heavy pattern At the connection between the 6" pipe drain laid in the street by and at the expense of the Municipality and the drain constructed by the owner a Inspection Chamber shall be provided fitted with a 6" stone-ware intercepting sewer trap of approved pattern having a water seal not less than 2" and a 3 inch ventilating shaft in accordance with Rule 11 In all other respects the Inspection Chamber shall be constructed in accordance with Rule 4 (See sketch.)

6 All down take pipes shall be of cast-iron, 3" in diameter and not less than ⅛" thick

7 The connection between every Nahani and the down-take pipe shall be by means of a [illegible] or 3" cast-iron pipe, discharging into a cistern head Nahani traps may be used directly connected to the waste water pipes, the latter shall be extended above the [illegible] accordance with Rule 11

8 In the case of Nahanis abutting on a street or road the waste water pipes shall discharge into a stoneware gully trap by means of a stoneware or cast-iron bend The gully trap shall discharge into an inspection chamber fitted with a sewer trap as per Rule 5 or into a private pipe drain The waste water pipes or nahani connections shall be constructed in accordance with Rule 23 for pipe drains. (See sketch)

9 In the event of the plinth of a house being much higher than the bed of the open drain, Nahanis on the ground floor shall discharge into the open drain by means of a 3″ discharge pipe brought down to such a level as to avoid a splash.

10 No water-closet or any arrangement by which night soil is to be removed on the water carriage system shall, except with the written permission of the Municipal Commissioner, be allowed to be connected with an open drain

11 Every vent pipe, anti-siphon pipe and waste water pipe shall if not provided with cistern heads and discharging into an open drain, be protected at the top by a wire dome and shall be (*a*) carried at least 15′ higher than any sky-light or window situated within a distance of 40′ therefrom, (*b*) carried at least 5′ higher than the eave of the roof if affixed to a wall supporting the eave, (*c*) erected or affixed so as to create the least practicable nuisance or inconvenience to the inhabitants of the neighbourhood.

12 The surface of all house-gullies not occupied by, or beyond what is occupied by, an open drain shall be paved with fine dressed blue-stone or Indian patent stone or other stone approved by the Commissioner At the lower end of the gully whether the open drain for sullage or sewage be in the centre or at the side, a jump-weir shall be formed as per full size plan to be seen in the Offices of the Drainage Department, so that while any ordinary flow of sewage will discharge into the connection with the inspection chamber a rush of storm water will jump over the opening and pass into the storm-water drain (See sketch.)

PIPE DRAIN.

13 In all cases where house-owners desire to drain their premises by a pipe drain instead of an open drain, the drain shall be a 6″ stoneware pipe drain jointed in cement and laid at a gradient of 1 in 50 where practicable When necessary a flatter gradient may be allowed by the Drainage Engineer

14 In such houses, as are without gullies, a heavy cast-iron pipe-drain (the joints to be run with molten lead and soundly caulked) may in accordance with Section 240 of the Municipal Act, be laid under the building Pipe drains may be of 4 inches diameter, only when allowed by the Drainage Engineer

15 At the connection between the 6″ pipe drain laid in the street by, and at the expense of the Municipality, and the pipe laid by the owner an inspection chamber shall be constructed fitted with a 6′ stoneware intercepting sewer trap having a water seal of not less than 2″ and with fresh air inlet the open end of the pipe being placed wherever practicable above the roof or in such position that in the event of a reverse current of air, it will not cause nuisance or annoyance to passers-by or persons residing within or near to the premises (See sketch)

16 The cover of all inspection chambers shall be of cast-iron, air-tight and fitted with a lip into a grooved frame The cover and frame of an inspection chamber subject to wheel traffic shall be of cast-iron of heavy pattern In all other respects the inspection chamber shall be constructed in accordance with Rule 4

17 Inspection chambers shall be so placed on any pipe drain that no portion thereof more than 75′ long shall be without an inspection chamber An inspection chamber at the point of every change of direction in any drain shall be deemed indispensable.

18. Every 6′ gully trap shall be connected with a 6″ pipe drain by means of 4″ stoneware branch pipe

19 The head of every pipe drain shall be provided with a 3″ cast-iron or galvanized iron vent pipe

20 A Nahani trap, approved by the Commissioner shall be provided in every Nahani except those specially provided for in Rule 23 (See sketch)

21 All down-take pipes shall be of cast-iron 3″ in diameter and not less than $\frac{1}{2}$″ thick.

22 Every down take pipe shall be carried up above the roof as a vent pipe and be protected at the top by a wire dome as far as practicable in accordance with the distances specified in Rule 11 as amended

23 Every Nahani on the ground floor shall discharge into a stoneware gully trap by means of a 3″ stoneware pipe, and every down take or waste water pipe shall be disconnected from the gully trap by means of a disconnection channel discharging into the gully trap (See sketch.)

24 In the event of there being an open chauk in the house, the Nahanis shall be constructed adjacent to the external wall of the chauk to allow of the down take pipes being fixed to and carried up against external walls

WATER CLOSETS

25 In the case of water closets native pattern soil pans of design approved by the Drainage Engineer may be provided and shall be properly laid and bedded in cement concrete at the required level and connected by means of porcelain traps and 4′ stoneware pipe and bends with an inspection chamber or soil pipe as the case may be. European pattern soil pans of design approved by the Drainage Engineer may be provided and shall be fixed in position with a teak wood moveable or hinged seat (See sketch)

26 The junction between a closet and branch, if the latter is of lead, shall be effectively made by a brass ferrule soldered with a wiped joint to the lead pipe, and the joint between the porcelain trap, and the brass ferrule made in cement boiled oil and spun yarn or soldered to porcelain (See sketch)

27 All soil pipes shall be 4′ in diameter and of cast iron not less than 3/16″ in thickness The connection between the soil pipe and the water closed trap shall be by means of a pipe fitted with a screw cap external to the wall for cleaning purposes. (See sketch)

28. Every soil pipe shall discharge into the 6″ stoneware pipe drain by means of 4″ stoneware bend into a chamber fitted with a cast-iron cover (See sketch)

29 In every case where there is a tier of water-closets one above another a 2½″ anti-siphon pipe shall be taken from each water trap except that of the highest water-closet and carried up above the roof and to such height as is prescribed in Rule 11 (See sketch)

30 A three gallons automatic or pull off flushing cistern of a pattern approved by the Drainage Engineer shall be securely fixed to the wall at least 5 feet above the seat and shall be connected by means of a 1¼″ lead pipe with an Indian rubber cone to the connection with the closet (See sketch)

31 All such flushing cisterns shall be supplied by means of an efficient water supply from a reservoir tank placed in a suitable position and height. The capacity of this reservoir tank shall not be less than 90 gallons for each seat. (See sketch.)

Rules in connection with the construction of privies on the Intermediate Water-Carriage system.

32 Every proposal for the construction of privies on Intermediate Water Carriage system shall comply with Clause 6° of the Bye-laws and also with the definition of the privy on the intermediate system at page 5† of the New Building Bye laws

33 Each seat shall be provided with a porcelain or earthernware pan with a sharp slope, or with a midmost flat glass plate with a sharp slope embedded on either side with cement or porcelain tiles. (See sketch)

34 In case of privy with a range of seats, arrangement shall be made to leave inspection holes at a distance of at least 5 feet for cleaning purposes. These holes shall be covered with C I frames with a hinged lid of the same pattern as hydrant boxes over the water mains The opening over the gully traps shall also have covers of the same kind and not grating (See sketch)

° Every person who shall construct a privy (including in this expression a privy on the intermediate system) shall comply with the following regulations —

(a) He shall provide on each side of such privy, except the entrance side, an open space at least 3 feet in width within the limits of the owner's premises and open to the sky,

(b) He shall cause any entrance gallery or communicating bridge to be at least 3 feet in width and open to the external air on both its sides and to be shut off from any portion of any dwelling house by a closely fitting door,

(c) He shall make in one at least of the walls of such privy a window of not less than 3 square feet superficial area opening upon an external open space,

(d) He shall cause the walls of such privy to be lined internally with a smooth impervious non absorbant coating of neat Portland cement not less than half an inch in thickness or of glass, glazed tiles or polished marble to a height of not less than five feet above the floor of such privy

† "Privy in the intermediate system" means a privy the excrementitious matter from which is collected in receptacles or spaces on the ground floor and flushed therefrom with water at regular fixed intervals by means of an automatically tilting tank fixed at a height of not less than 6 feet above the receptacle and kept automatically supplied with water by means of a separate supply tank

35 The capacity of the flushing tank shall be determined by the length of the drain behind the privy and the number of storeys at the premises in which the privies are situated. The distance from the centre of one privy and the centre of the next shall not be less than 3 feet and for every foot run of the drain, one gallon flush shall be provided and for every storey one gallon more irrespective of the number of privies on each storey For example, if the length of the drain is 12 feet and there are three upper storeys, the capacity of the tank will be 15 gallons. If the length of the drain is 20 feet and there is only one upper storey with 6 privy seats, the capacity will be 21 gallons. (See sketch)

36. The length of the drain or 6" S W pipe line shall not exceed 20 feet, but if it exceeds this length, it should be graded from either end of the privy so as to meet near the centre, and flush tanks of the capacity mentioned in condition 35 should be provided at either end

37 All flush tanks should be regulated to flush twice in one hour

38 The storage tank should contain 20 (twenty) times the capacity of all the flushing tanks combined

General rules for the laying of the drains, erection of all cast-iron pipes, and their fittings and testing the same

39 The pipes must be of well burnt glazed stoneware, uniform in thickness

40 No pipe drain shall be less than 6" in internal diameter unless otherwise allowed by the Drainage Engineer, and must be laid at a gradient of 1 in 50 wherever practicable, unless otherwise allowed by the Drainage Engineer Branch drains may be 4" in diameter

41 The stoneware pipes shall be all laid and fitted dry previous to the jointing being commenced, such pipes being neatly cut as may need to be shortened in order to bring in the junctions in the exact position required All the pipes shall be laid perfectly true both in line and gradient and they shall be laid on a 6" concrete bed in the case of "made ground" or when in the opinion of the Drainage Engineer this course is necessary

42 All the pipe joints shall be caulked with cemented or tarred gasket in one length for each joint and sufficiently long to entirely surround the spigot end of the pipe, the gasket to be driven as far as possible into the joint by means of a suitable instrument After the pipes are thoroughly cleaned and moistened neat Portland cement is to be forced into the joint until the whole space around the spigot, between it and the socket, is quite full, and a splayed fillet of neat cement is to be laid all round the joint

43. Before filling in the trench the joint of the pipe drains must be proved water-tight by filling the pipes with water to the level of 6" above the top of the highest pipe in the stretch and heading the water up for the period of one hour or such further time as directed

44 No stretch of pipe line shall under any circumstances be covered up until inspected and passed by the Head Plumber or the Drainage Inspector of the District as the case may be

45 The inspection chambers on the pipe drains shall be constructed of brick work laid on cement concrete and be internally plastered with a 1" coat of cement and sand (1 to 1) In the chamber a stoneware channel with a half round invert shall be formed of the width and full depth of the pipe drain The walls shall be brought up to the surface of the ground and covered with a cast-iron air-tight cover and frame. The cover of an inspection chamber shall be of cast-iron air-tight and fitted with a lip into a grooved frame The cover and frame of an inspection chamber subject to wheel traffic shall be of cast-iron of heavy pattern

SOIL WASTE AND VENT PIPES

46 The socket joints between metal and metal when above ground shall be made completely air-tight with a mixture composed of Portland cement, boiled oil and chopped hemp, and by a ring of hemp gasket

47 The joints of pipes and shafts above ground after they are thoroughly set must be proved air light by smoke produced and applied as directed.

48 All the cast-iron appliances and fittings must be of approved pattern and coated by dipping in Dr Angus Smith's solution before being used in the work

49 In case of new buildings the drainage must be in accordance with the plan which has previously been approved by the Municipal Commissioner.

The floor of every horse-stable should be paved over the whole area with suitably dressed blue stone or other suitable material laid on a 6" bed of good lime concrete. The paving should be sloped at an inclination of at least 1 in 48 towards the channel hereinafter described.

lined and laid at a slope equal to 1 in 60

51 Above the concrete shall be put down a layer of good and well selected muram properly rammed and finished off to the same slope as the concrete or such suitable paving as may be approved by the Drainage Engineer

52 Meeting the muram or paving and at right angles to the stalls shall be constructed a half round channel 12" wide of suitably dressed blue stone or other suitable material (See sketch)

53 The channel shall have a longitudinal slope of at least 1 in 100 to one point, or more as may be selected and at each of such points a 6" by 6" stoneware gully trap fitted with a horizontal and vertical cast-iron gratings shall be fixed (See sketch)

54 All the gully traps shall be connected by a 6' stoneware pipe drain or drains with an inspection chamber constructed on a line of 6" stoneware pipe drain connected with the street sewer (See sketch)

55 The construction of an inspection chamber, the laying of the pipe drain and connecting with the street sewer shall be in accordance with the rules laid down for pipe drains.

56 It shall be incumbent on every owner of a stable to renew the muram in the stalls at least twice a year or as often as may be required by a responsible Officer of the Municipality.

CATTLE STABLES

57 The floor of every cattle stable shall be paved over the whole area with suitably dressed bluestone or other suitable material laid on a 6 bed of good lime concrete The paving shall be sloped at an inclination of at least 1 in 60 towards the channel hereinafter described

58 Behind every range of stall a half round channel 12" wide shall be formed with a slope of at least 1 in 60 in every part down to a gully trap hereinafter described (See sketch)

59 The channel shall discharge into a catchpit through a glazed S W gully trap The catchpit shall be 3' by 4' by 5' deep It shall be covered with a strong cast iron cover fitted into a rebated frame The catchpit shall be placed immediately at the point of discharge or lowest point of the channel and connected with the pipe drain within the premises by means of an inspection chamber built complete with a 6' intercepting sewer trap (See sketch.)

60 A horizontal and a vertical iron grating with bars not more than ½" apart shall be fixed in the catchpit (See sketch)

61 The laying of the pipe drain the construction of the inspection chamber and the connection with the street sewer shall be subject to the rules for pipe drains

CESSPOOL

Drainage of premises not within 100 feet of a Municipal drain or some place legally set apart for the discharge of drainage

62 As far as practicable buildings of this description shall be drained by open drains in accordance with the rules laid down for such drains

63 If practicable, the sullage from all Nahanis shall be discharged among vegetation or used for gardening purposes but if this is impossible then the sullage shall discharge into a cesspool having a capacity of at least 50 c ft

64 The capacity of a cesspool shall be calculated below the bottom of the inlet drain

65 The house-drain if open shall be conveyed with and shall discharge by means of a 6" by 6" stoneware gully trap into the cesspool All cesspools shall be closely covered and fitted with a cast iron air tight frame and cover

66 Every cesspool shall be ventilated by a cast-iron or galvanized iron pipe not less than 3" in diameter

67 The vent pipe shall be protected at the top by a wire dome and shall be (*a*) carried at least 15' higher than any sky-light or window situated within a distance of 40' therefrom, (*b*) carried at least 5 feet higher than the eave of the roof, if affixed to a wall supporting the eave, and (*c*) erected or affixed so as to create the least practicable nuisance or inconvenience to the inhabitants of the neighbourhood.

68 There shall be a cesspool for the privies separate from that for the Nahanis (if any) and it shall have a capacity of at least 3 c. ft. per every privy seat or slot, with a minimum of 25 c ft.

69 Every cesspool must be placed in a position convenient for the access of Municipal carts.

70 Every cesspool shall be constructed of brickwork in cement laid on cement concrete and internally plastered with a 1" coat of cement and sand (1 to 1). The walls shall be brought up to 6" above the surface of the ground, and the cover mentioned in Rule 3 shall be placed upon them

71 An arrangement must be made with the Municipal [illegible] Inspector of Drains to attend at the premises to see the execution of the drainage work and the making of any connection that may be necessary with the Municipal drain.

72. No connection must be made with a Municipal drain nor must the same be exposed except in the presence of the $\frac{\text{Head Plumber}}{\text{Inspector}}$

73 The whole of the work must be done under the supervision of the Municipal $\frac{\text{Head Plumber}}{\text{Inspector}}$ who may be seen daily between the hours of 7 and 8 A M at his Office, in Bapty Road, Kamatipura Mint Road, Fort Charai Road, Girgaum Babula Tank Road, and DeLisle Road

74 The said $\frac{\text{Head Plumber}}{\text{Inspector}}$ will see that the principles adopted by the Municipality are carried out but no such close supervision can be given by any Municipal Officer as to relieve the house owner and his plumber from the duty of taking due care in the execution of the work and providing good and sufficient materials and workmanship

M INST C E.,

DEPUTY EXECUTIVE ENGINEER, DRAINAGE,

for Executive Engineer

NOTE —A person erecting rebuilding or occupying any building before arrangements necessary for the effectual drainage of such buildings are carried out in accordance with Municipal requirements will render himself liable to a penalty of Rs 500 under Section 234 of the City of Bombay Municipal Act 1888.

Printed at the D A. Press, Fort, Bombay

A P P E N D I X (P)

BOMBAY IMPROVEMENT TRUST.

Scheme No | Block No. | Case No.

TRUST VALUATION BASED ON ANNUAL RETURN.

Name.

Property Street No | No. of Floors

Gross assessment Rs p a | Nature of occupation.

St.Nos Area Sq.Yds

Buildings	c.ft. at	annas per c.ft (new) =	Rs
		=	
		=	
		=	
			Rs.

Years

Life / Age | Accumulated Sinking fund = % on Rs

RENTS Rs.---as. X 12 = Rs

LESS

Rates at per cent. on Rs Rs.

Vacancies, Bad Debts and Collection at per cent. on Rs

Repairs on $\frac{9}{10}$ of

S.F. on

Insurance on $\frac{9}{10}$ of

Fazandri Rent

Government dues

Total Outgoings Rs

Net Annual Return Rs

Y.P.

Capital Value Rs.

DEDUCT

2 2

Rs.

D E D U C T

Depreciation Rs.

Sanitary Improvements,&c "

Total Deductions Rs.

Compensation exclusive of compensation to to Fazan. or Government Rs.

A D D

Fazan. or Government dues Rs p. a capitalized at 25 Y.P.

Total Compensation for all interests in the property Rs

Dated 191

Sd. I.C.E.,

Assistant Land Manager

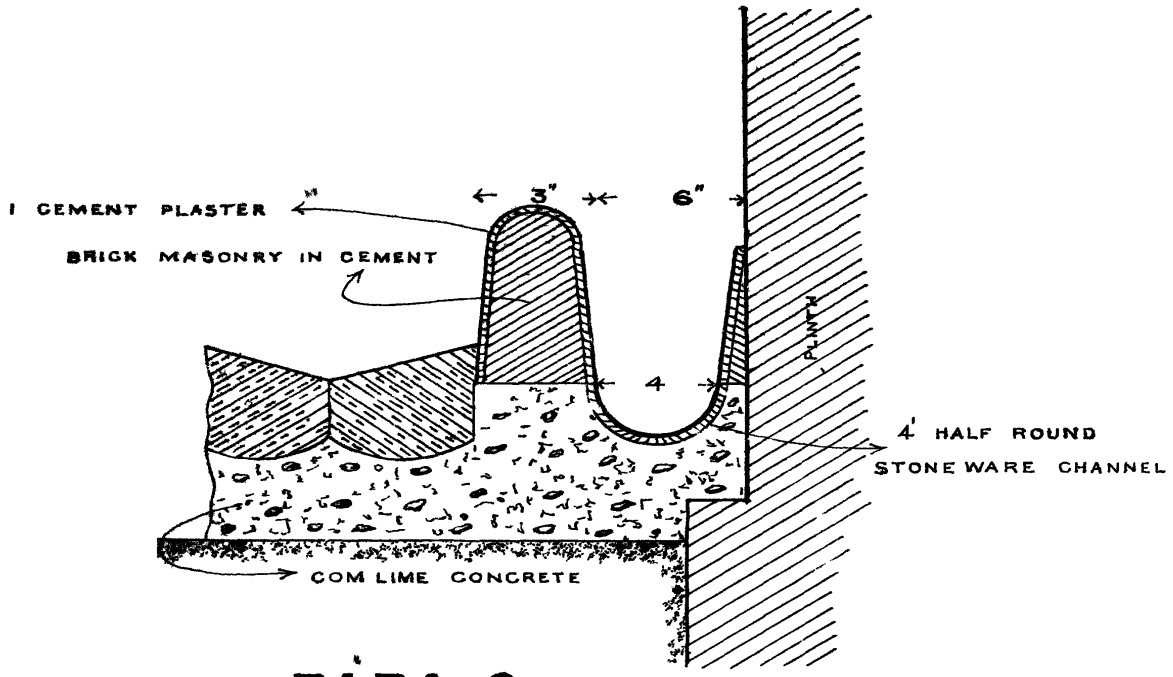
SANITARY IMPROVEMENTS. Sq ft Rs

St. Nos.

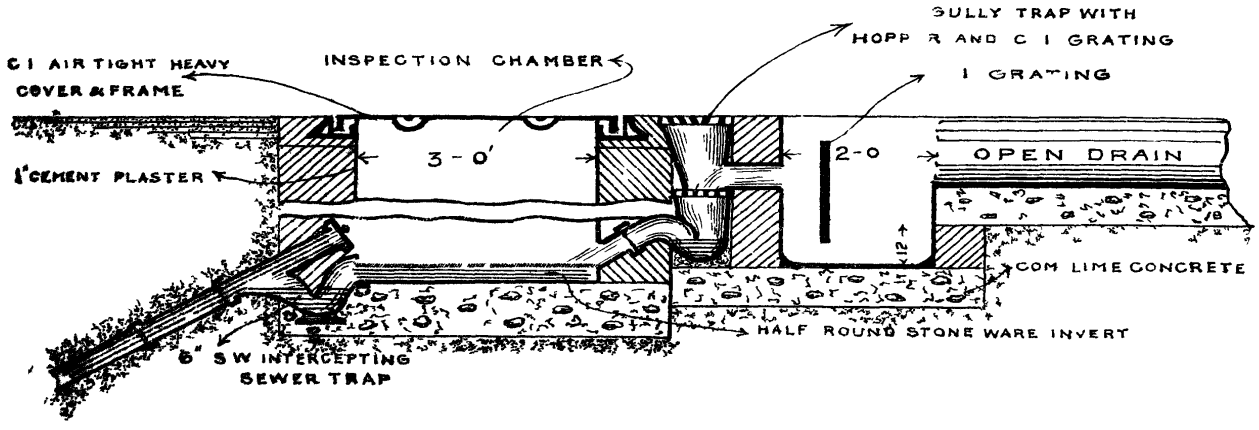
Replacing earth floor by Koba flooring			Sq.ft @ Rs	per 100	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	
Replacing plank walls by Brick Masonary			Sq ft @ Rs.	Sq.ft. Per 100	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	
"	"	"	"	"	

Total Rs.

23



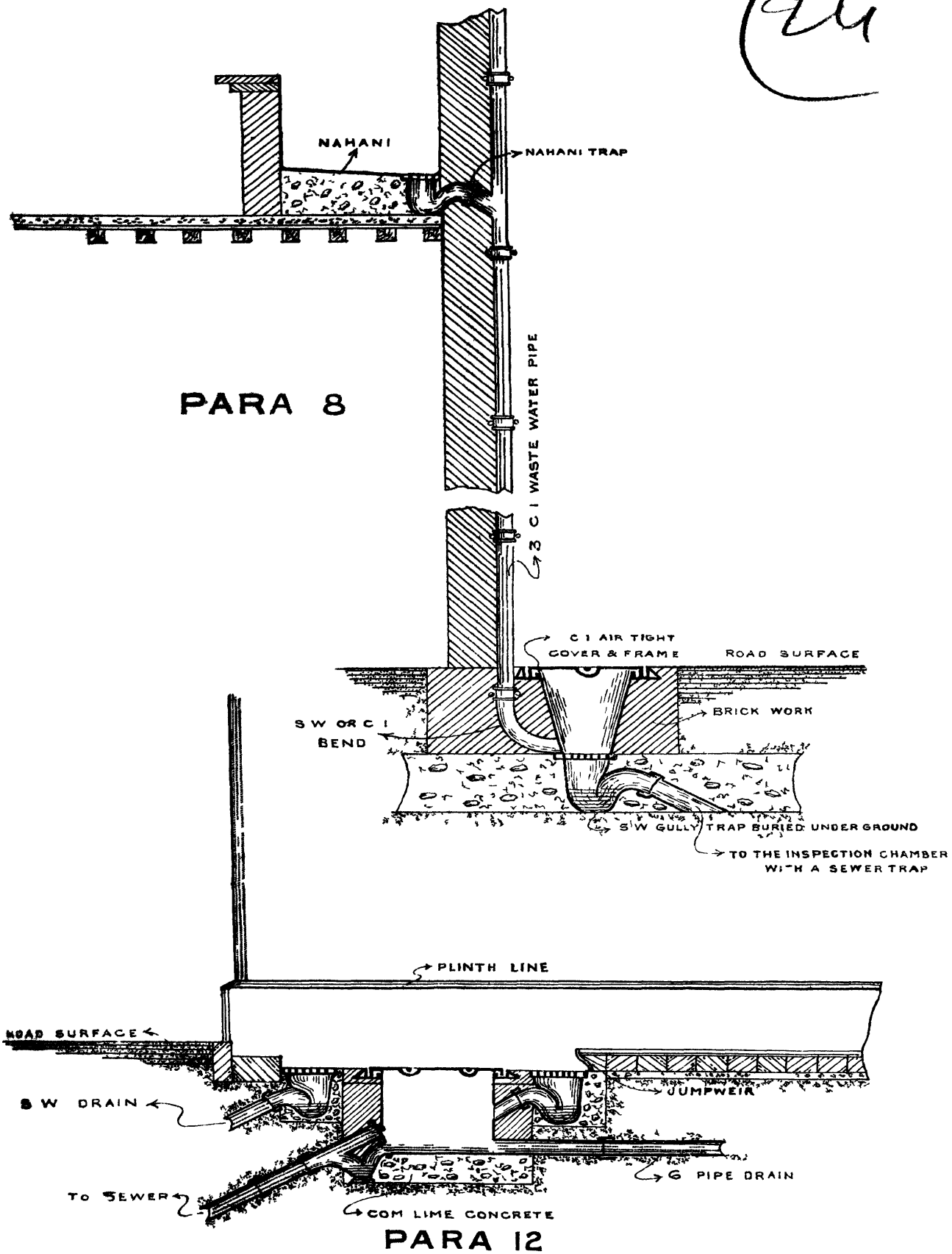
PARA 2



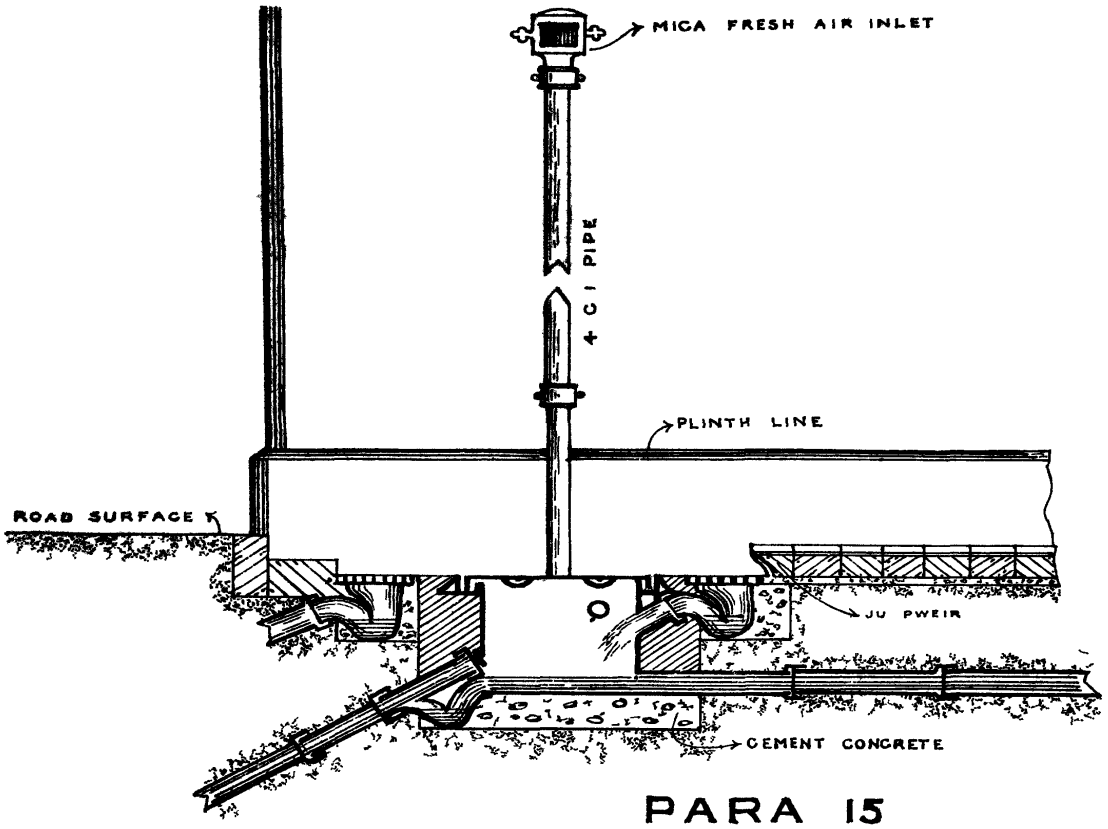
PARAS 3, 4, & 5

(2)

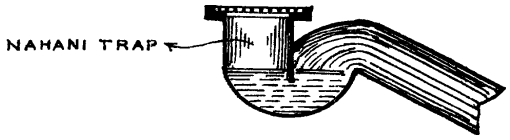
(24


NAHANI
NAHANI TRAP
3 C I WASTE WATER PIPE
PARA 8
C I AIR TIGHT
COVER & FRAME
ROAD SURFACE
BRICK WORK
S W OR C I
BEND
S W GULLY TRAP BURIED UNDER GROUND
TO THE INSPECTION CHAMBER
WITH A SEWER TRAP
PLINTH LINE
ROAD SURFACE
S W DRAIN
JUMPWEIR
G PIPE DRAIN
TO SEWER
COM LIME CONCRETE
PARA 12

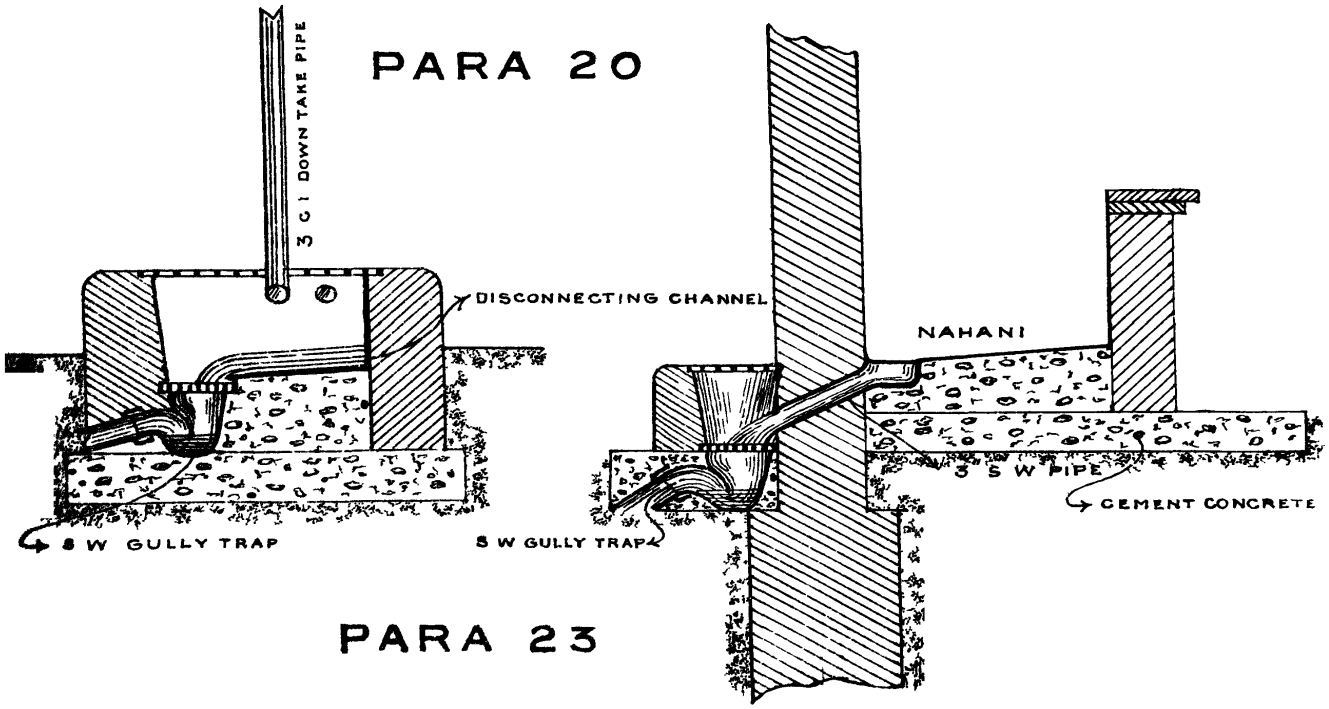
(3)



PARA 15

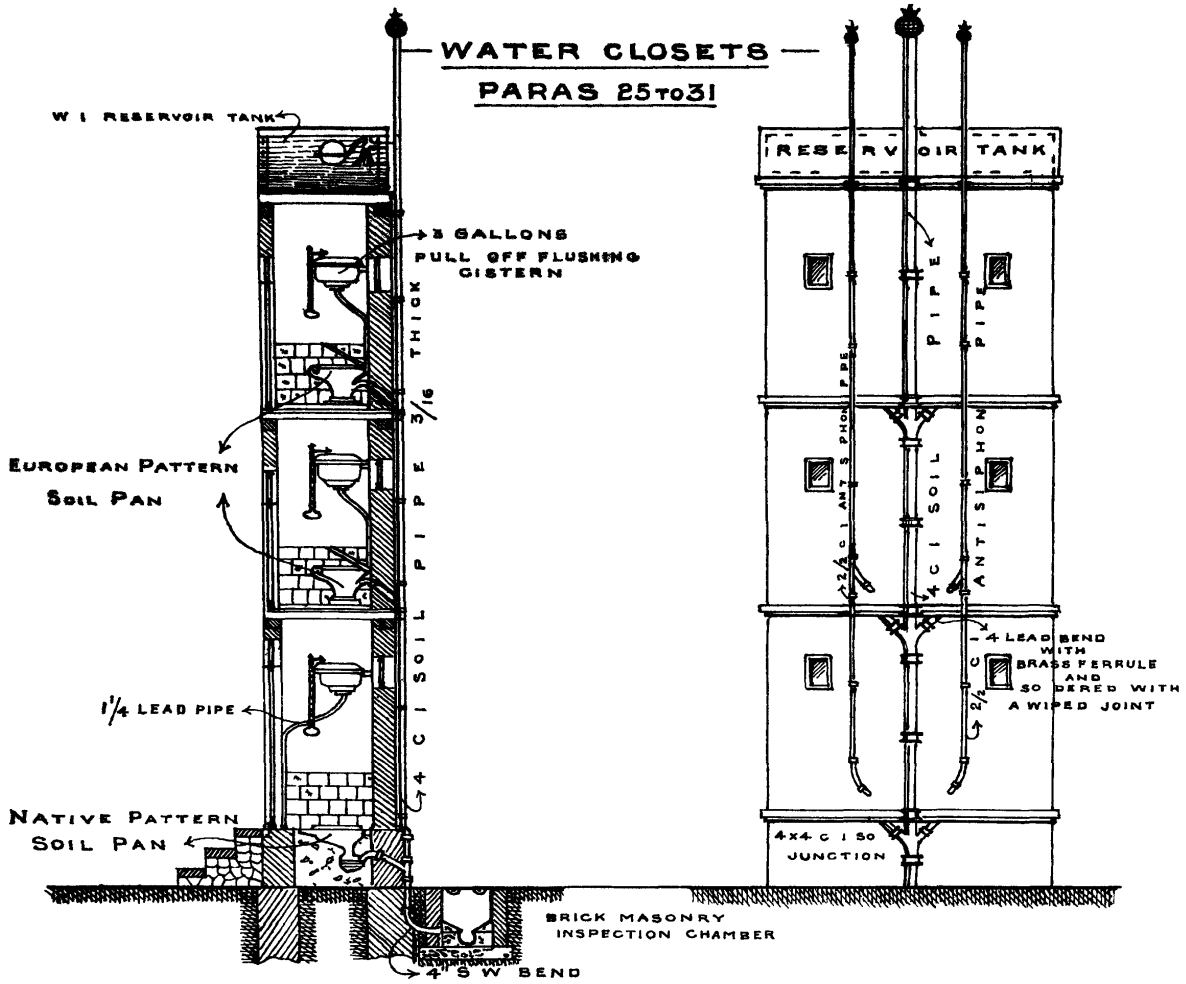


PARA 20

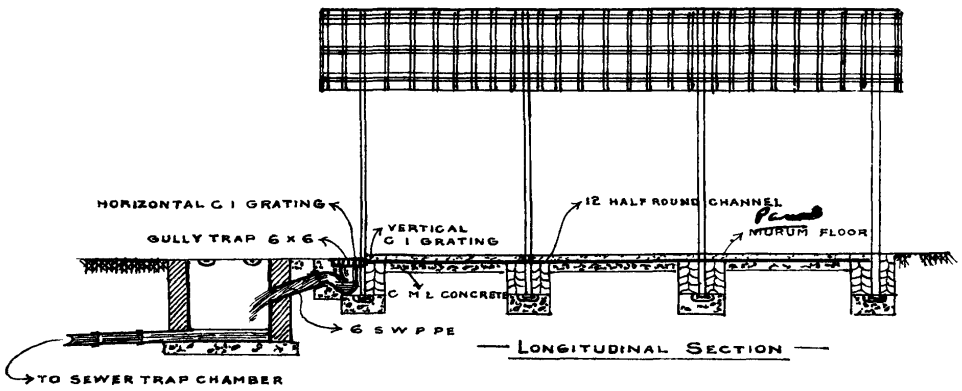


PARA 23

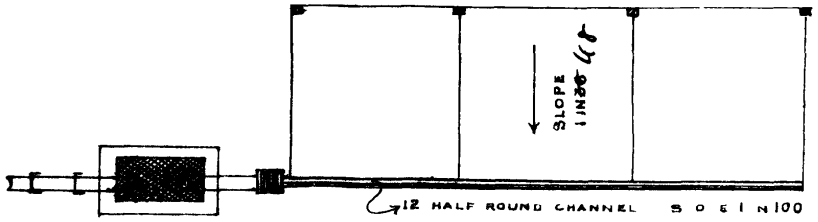
WATER CLOSETS
PARAS 25 TO 31



HORSE STABLE
PARAS 52 TO 54

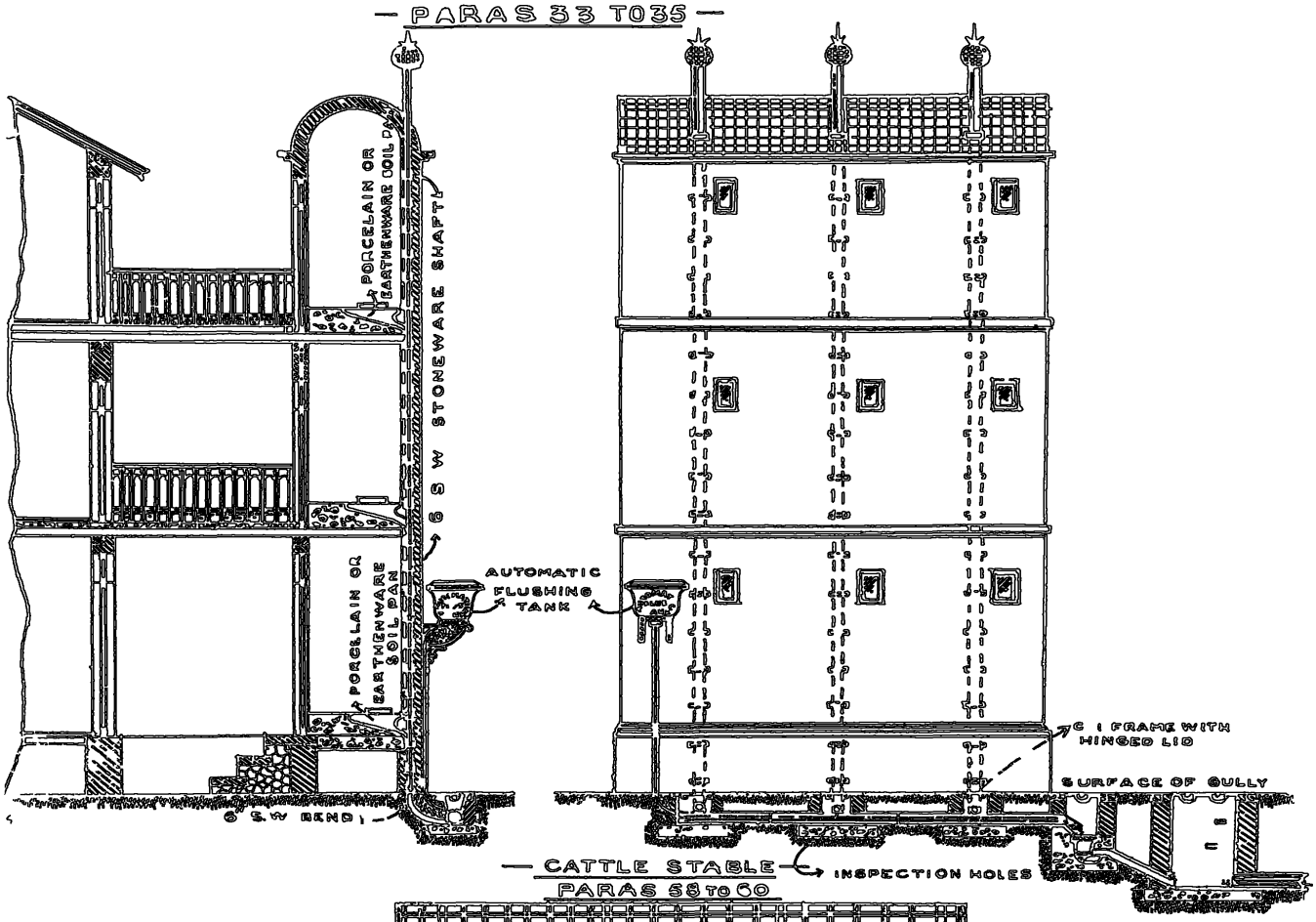


LONGITUDINAL SECTION

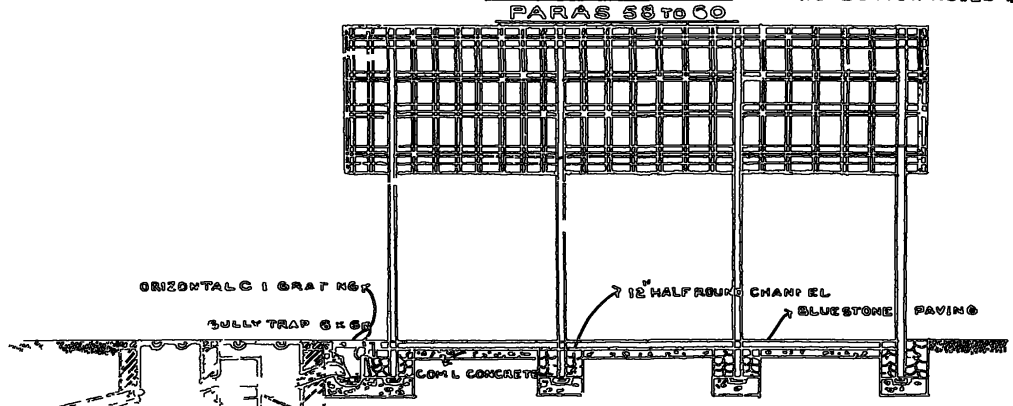


PLAN

— PRIVIES ON THE INTERMEDIATE —
— WATER CARRIAGE SYSTEM —
— PARAS 33 TO 35 —



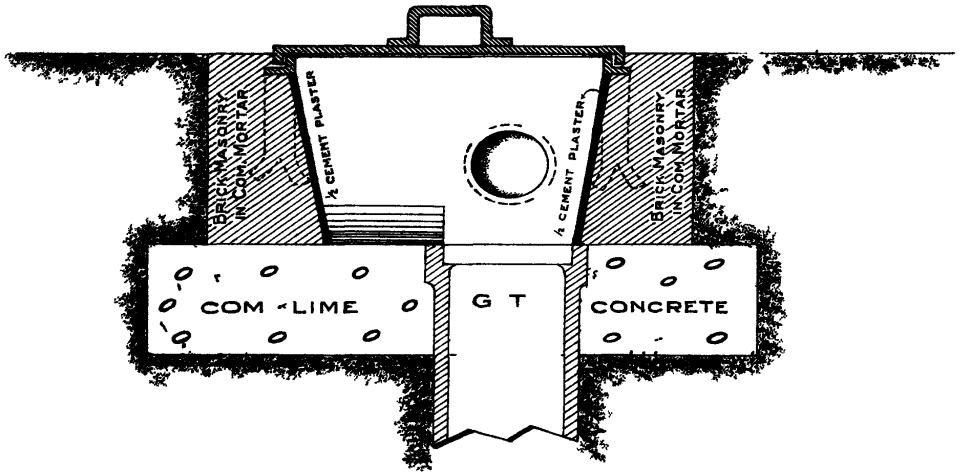
— CATTLE STABLE —
PARAS 58 TO 60



2A

GENERAL RULE

HINGED IRON COVER AND FRAME OVER A GULLY TRAP



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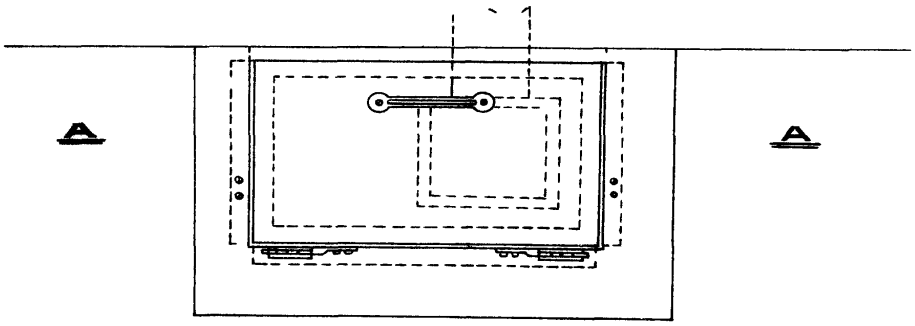


PLAN

Copies 45

Gen

(3)

G R S VI—G/32]

SUBJECT Printing of the Joint report of Messrs Chas Lancashire Engr & Ramsden Asst Drainage Works and the Mech Engr on the working of the Stone System of Ejectors in the Bombay Circle

Diary No of letter replied to 2342

Section Genl
File No 78-17
Serial No 81

GENERAL AND REVENUE SECRETARIAT,
(Genl)
the 191

Date of issue 14-5-18

Signed by M B T Keenan Esqr

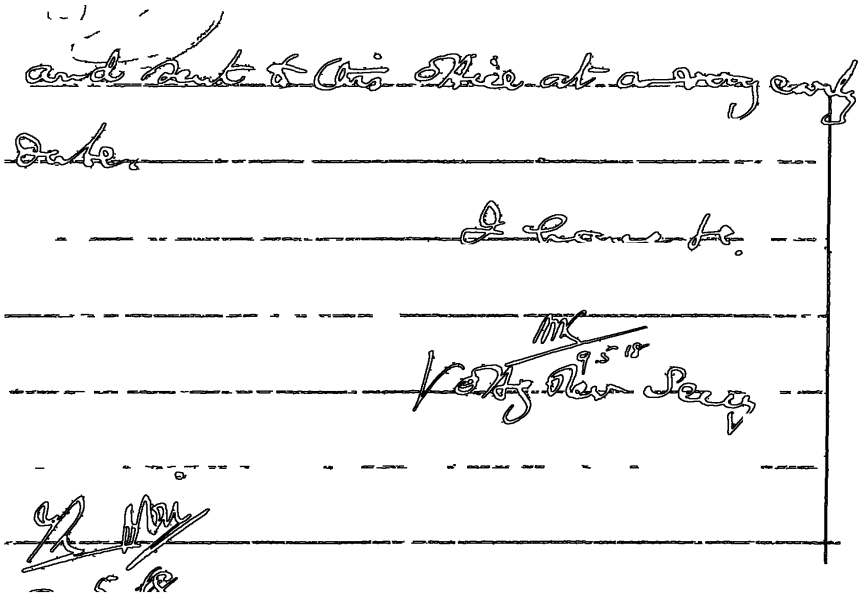
Ex Note
No 6394
ml 7817-8 of 13 5 18

To

The Superintendent,
Govt Press

Sir,

I am directed to forward a copy of the Joint report of the 5th March 1918 drawn up by Messrs Lancashire Engr & Ramsden Asst Drainage Engrs and the Mech Engr on the working of the Stone System of Ejectors and other sewerage matters in the Bombay City and to request you that 100 copies of same may be caused to be printed



List of enclosure

Copied by

Examined by

WD 86—GPB—60,033—16-11 16

No 91
B M 109]
SECRETARIAT
I
REVENUE
14 JUL 1918
GEN. & REV.

52.

OFFICE OF THE PRESIDENT,
MUNICIPAL COUNCIL,
BANGALORE CITY, DATED 28-6-1918

FROM

DEWAN BAHADUR RAJA SABHA BHUSHANA
K P PUTTANNA CHETTY, ESQ, C.I.E.,
Honorary President, Municipal Council,
Bangalore City

To

The Secretary to the Government of
His Highness the Maharaja of Mysore,
General and Revenue Departments,
Bangalore

SIR,

In continuation of my letter No 360/C I dated the 21st March 1918 submitting a joint report of the Executive Engineer, City Drainage Project, the Municipal Engineer and Mr B Usman Khan, Municipal Councillor, on the working of Shone Ejectors in Bombay City, I have the honor to submit herewith for information and orders of Government copies of resolutions of the Municipal Council and the City Improvement Committee dated the 4th May and 11th June 1918 respectively

I have the honor to be,
Sir,
Your most obedient servant,
K P Puttanna Chetty
Honorary President

P.T.O.

G1.B—2.000—29-8-13

07163

191

From The Honorary President Municipal Council Bangalore City

To The Secretary to the Government of Mysore Revenue Department Bangalore

Dated 26th
Despatched 28th } June 1918

Received

General No 530 / C 2

Enclosure No

Submitting in continuation of my letter no 360/C2 dated the 21st March 1918 copies resolutions of Municipal Council and City Improvement Committee dated 4th May 18 & 11th June 18

BANGALORE CITY MUNICIPALITY.

No. XXIII.

Proceedings of an Ordinary General meeting of the City Municipal Council. Bangalore, held in the Council Chamber, City Municipal Office on Saturday the 4th May 1918.

P r e s e n t

Dewan Bahadur Rajasabha Bhushana

K.P. Puttanna Chetty, Esq., C.I.E., Honorary President

M. Subba Rao, Esq., M.B., C.M., L.S.Sc., Vice President

B. Krishnamurthi Rao, Esq , B.A., L.M S , Health Officer.

C.V.Narasimhiengar,Esq.,B.A.,B.L.	Father P.M Briand
B. Chinnaswami Chetty, Esq.	M. Basavayya, Esq., B.A , B.L
B.K. Garuda Char, Esq.	D.V. Gundappa, Esquire
G. Siddaveerappa, Esq.	B. Usman Khan, Esquire
K. Ramayya, Esquire	M.K. Krishnamurthi Rao, Esq
B. Venkatramayya, Esq., B.A	S. Venkatrangiengar, Esq

K.S Krishna Iyer, Esq , B.A

A b s e n t .

Revd. D. A. R e e s .	D.B Ramachandra Mudaliar, Esq
M. Ramachandra Rao Sindhe, Esq	N Surappa, Esquire
B.V. Ramaswami Chetty, Esq , B.A	M Subbayya, Esq , B A
M. Abbas Khan, Esq	S Venkatrama Iyer, Esq , B.A

D. Adeppa, Esquire

---

1. Report of the Municipal Engineer and Executive Engineer City Drainage Project on the working of the Shone Ejectors and other Municipal matters in Bombay City

Resolution - The report on the working of the Shone Ejectors at Bombay may be submitted to Government

The other parts of the report are recorded The scheme of defining the set-back of the several roads of the City specified in

34

the report is very important and should be worked out at an early date.

Sd/- K.P. Puttanna Chetty,
Honorary President.

C O P Y *

Hon. President

C.R.G.

BANGALORE CITY MUNICIPALITY

Proceedings of the City Improvement Committee at the meeting held in the Municipal Office on Tuesday the 11th June 1918 at 7-30 A.M.

P r e s e n t .

Dewan Bahadur Rajasabha Bhushana

K.P Puttanna Chetty, Esq., C.I.E., Chairman

Srinivasachatya Cadambi, Esq., B.A., L.C.E , Chief Engineer.

F.S. D'Souza, Esq , B.A., B.L., Secretary to Government, Departments of Education and Agriculture, Bangalore.

M.V. Sundaram Iyer, Esq., B.A., B.C.E., Deputy Chief Engineer

J.B.A D'Cruz, Esq., B.C.E , &c , Executive Engineer, C.D. Project.

S. Ramachandra Rao, Esq., B.A., A.C.E., Municipal Engineer

F. Fernandes, Esq., L.R.C.P & S., L.F.P. & S., Health Officer.

M. Ramaiya, Esquire.

B.K. Garuda Char, Esquire.

Mandi Hariappa, Esquire.

Yajaman Basappa Esquire

R. Subba Rao, Esq , M.E., C.E., L.S.Sc., Secretary

A b s e n t .

T.G. Lakshmana Rao, Esq., L.C.E.,

S.M. Lakshmisarasappa, Esq., B.Arch., Executive Engineer, Mysore

M.S. Ramachandra Mudaliar, Esquire.

S. Venkatrangiengar, Esquire

---

11. Joint report of the Executive Engineer City Drainage Project, Municipal Engineer and Mr. T. Umar Khan Municipal Commissioner on the working of the Stone Filters and City Improvement Trench in the City

Resolution of the Municipal Council dated [illegible] on the Subject

Resolution - The report having been already submitted [illegible]

(36

and the points to be decided being of a highly technical character, the orders of Government may be awaited.

Sd/- K.P Puttanna Chetty,

C h a i r m a n .

---

* C O P Y *

For Hon President

C.R.G.

GRS VI-71]

SUBJECT .. Report on the working of the Shone system of Ejectors & of other Mun matters in Bombay City.

Diary No. of letter replied to 7342 / 91

Ml Section

File No 78-17

Serial No 10

~~General and~~ Revenue Secretariat

(Ml Section

Proceedings of the Government of
His Highness the Maharaja of Mysore

, *the* *191*

Date of issue 31-1-18

Signed by Mr M S Ramachandra Rao

Read —(1) letter no 360 / C9 dt 19th March 1918 from the President, Mun Council, Bangalore City submitting a copy of the joint report of Mr J. A. D'Cruz, Supdg Engr, City Drainage Project, Mr T Ramachandra Rao, Mun Engr & Mr B Usman Khan, Mun Councillor on the working of the Shone system of Ejectors & other Municipal matters in the Bombay City.

Order Thereon — No

(2) 530 / C9 dt 26th June 1918

OU()

this be

i Printed ?

ii treated as a standing order ?

ii published in the Gazette English part ?

v translated ?

v placed at the disposal of the press ?

ii published in the Gazette Kannada part ?

14/7/18

the same Officer submitting copies of the resolutions of the Municipal Council & the City Improvement Trust Committee on the subject.

Order No. 1805-17 dt 31.7.18
dt 28-12-10

The Report which has been printed will be circulated to all the Presidents of the District Head Quarter Town Mun Councils and the President of K.G.F Sanitary Board for information. subject to approval

List of enclosures

To
The President, Mun Council, Bangalore City
President, Mun Council, Mysore City
" President of other Head Quarter Town Mun Council.
" President of K.G.F. Sanitary Board
" The Chief Engr. of Mysore
" & Chairman, City Improvement Trust Board, Mysore

Copied by
Examined by